

# User Manual

# KMW150CCD

Water Chiller Unit for the Sapphire series CCD Detector

**October 2001**  
**Version 1.1**

**Oxford Diffraction Limited**  
20 Nuffield Way, Abingdon, Oxfordshire.  
OX14 1RL. UK  
Tel: +44 (0)1235 532132  
Fax: +44 (0)1235 528005  
<http://www.oxford-diffraction.com>



**oxford diffraction**



---

## Important Information

This user manual is intended to help the user operate the KMW150CCD water chiller unit manufactured in Poland by Oxford Diffraction.

Product:	KMW150CCD
Model Type:	CCD chiller unit
Electrical Ratings:	1/N AC 230 V 50/60 Hz 150 Watts

## Before attempting to operate the system, PLEASE READ THE INSTRUCTIONS.

This product should only be used by persons legally permitted to do so.

If the equipment is used in a manner not specified in the User Manual, the protection provided by the equipment may be impaired.

### Important Health and Safety Notice

When returning components for service or repair it is essential that the item is shipped together with a signed declaration that the product has not been exposed to any hazardous contamination or that appropriate decontamination procedures have been carried out so that the product is safe to handle.

Care has been taken to ensure the information in this manual is accurate and at an appropriate level. Please inform Oxford Diffraction if you have any suggestions for corrections or improvements to this manual.

This users' manual has been written according to standard 89/392/EEC and further modifications.

Xcalibur is a trademark of Oxford Diffraction Limited in some jurisdictions and a registered trademark of Oxford Diffraction Limited in other jurisdictions.

Oxford Diffraction acknowledges all trademarks and registrations.

Copyright © 2000 Oxford Diffraction Limited. All rights reserved. No part of this document may be reproduced or distributed in any form, or by any means, or stored in a database or retrieval system, without prior written permission of Oxford Diffraction.

# Contents

<b>1. Health and Safety Information .....</b>	<b>1</b>
1.1 General.....	1
1.2 Electrical Safety.....	1
1.2.1 Potential Electrical Hazards .....	2
1.2.2 Recommended Precautions.....	2
1.2.3 First Aid .....	2
1.3 Mechanical Handling Safety.....	3
1.4 Safe Mechanical Practice.....	3
1.5 Moving Parts .....	3
1.6 Modifications and Service .....	3
<b>2. Introduction .....</b>	<b>4</b>
2.1 Scope .....	4
2.2 How to Use This Manual .....	4
2.3 System Description .....	4
<b>3. Specifications.....</b>	<b>5</b>
3.1 Environment .....	5
3.2 Performance Data .....	5
3.3 Electrical Services .....	5
3.4 Water Supply.....	5
<b>4. Technical Description.....</b>	<b>6</b>
4.1 Overview .....	6
4.2 Operating Principles .....	7
4.2.1 Water Conditioning Check .....	9
4.3 Interfaces.....	10
4.3.1 Water Supply.....	10
4.3.2 Electrical Connections.....	11
<b>5. Handling, Installation, Storage and Transit Information .....</b>	<b>12</b>
5.1 Reception and Handling .....	12
5.1.1 Delivery .....	12
5.1.2 Unpacking .....	12
5.1.3 Weights, Dimensions and Lifting Points.....	12
5.2 Installation and Setting to Work .....	13
5.2.1 Preparation of Site and Services .....	13
5.2.1.1 Environmental Requirements .....	13
5.2.1.2 System Layout .....	13
5.2.1.3 Electrical Services.....	13
5.2.1.4 Water Supply .....	13
5.2.2 Setting to Work.....	13
5.2.2.1 Equipment Required .....	14
5.2.2.2 Setting up Procedures .....	14
5.3 Storage.....	15
<b>6. Operating Instructions .....</b>	<b>16</b>
6.1 Warnings and Cautions .....	16
6.2 Controls and Indicators .....	16

---

6.3 Switch-on Procedure .....	16
<b>7. Maintenance Schedule .....</b>	<b>17</b>
7.1 Introduction.....	17
7.2 Annual Maintenance Schedule .....	17
<b>8. Maintenance Instructions.....</b>	<b>18</b>
8.1 Filling the Reservoir with Water .....	18
8.2 Cleaning the Water Filter.....	19
<b>9. Trouble Shooting .....</b>	<b>20</b>
<b>10. Spares .....</b>	<b>21</b>
<b>11. Additional Information.....</b>	<b>22</b>
11.1 Drawings .....	22
<b>12. CE Conformity Notice .....</b>	<b>23</b>

# 1. Health and Safety Information

## 1.1 General

In normal operation the system is designed to operate safely. All users of the KMW150CD water chiller unit should be aware of potential hazards which exist in and around equipment of this type and the ways of avoiding possible injury and equipment damage which may result from inappropriate ways of working. A description of such potential hazards and how to avoid them is given in this section.

This manual adopts the following convention:

**WARNING**

**Indicates a potential hazard which may result in injury or death**

**CAUTION**

**Indicates a potential hazard which may result in damage to equipment**

Warning symbols on the equipment are:



**Protective conductor terminal**



**Earth (ground) terminal**

**CAUTION**

**Risk of electric shock**

**CAUTION**

**Refer to accompanying documents**

See original manufacturers' manuals for further safety data on third party equipment supplied with the system. A list of these is given in this manual.

**WARNING**

**Do not take risks. You have a responsibility to ensure the safe condition and safe operation of equipment.**

## 1.2 Electrical Safety

In normal use the user is protected from the dangers associated with the voltage, current and power levels used by the equipment. Only suitably qualified personnel should attempt to disconnect, dismantle or modify the equipment.

### 1.2.1 Potential Electrical Hazards

The following list is not intended as a complete guide to all the electrical hazards on the system, but serves to illustrate the range of potential hazards that exist:

- electric shock
- electric burn
- fire of electrical origin
- electric arcing

### 1.2.2 Recommended Precautions

**WARNING**

**All of the electrical equipment supplied as part of the system should be provided with a protective ground. Do not remove protective grounds as this may give rise to an electrical safety hazard. It is vitally important that the system is properly grounded at all times.**

**Follow local and national electrical regulations and procedures.**

**Do not defeat interlocks, remove connectors, disconnect equipment, open safety covers, dismantle or modify equipment unless you are qualified and authorised to do so and you are fully conversant with its operation and potential hazards or have total assurance through your local electrical permit to work system that the equipment has been made safe.**

**Make sure that the mains supply is fused at an appropriate rating and that it can be isolated locally via a clearly labelled, clearly visible and easily accessible isolating switch. Isolate the supply before carrying out any maintenance work.**

### 1.2.3 First Aid

A course in first aid to include methods of artificial respiration is recommended for those whose work involves equipment which may produce a high voltage.

**WARNING**

**Do not attempt to administer first aid to someone who may have suffered electric shock until the source of the shock has been isolated.**

**Mains voltages are present in the system. These can cause serious injury or death.**

**Only personnel qualified and experienced to work with such currents and voltages should perform service or maintenance work on this equipment.**

## 1.3 Mechanical Handling Safety



### **WARNING**

Lifting points are provided for safe handling of components and safe handling practice must be observed to comply with local regulations. Check that lifting points are used only for the job intended. The system itself and some components are heavy and require careful handling. Use safe lifting procedures for heavy items to prevent possible strain injury.

## 1.4 Safe Mechanical Practice

In normal use personnel are not required to undertake mechanical work. However, servicing or repair may necessitate access to any part of the system. Only suitably qualified personnel should attempt to dismantle, modify or repair equipment.

Water connections should be made and tested in accordance with any local and national safety regulations.

## 1.5 Moving Parts

There are a number of moving parts in the system which are powered by electric motors.



### **Warning**

**Injury could result if clothing or body parts become caught in moving mechanisms.**

**Keep clothing, hands etc. away from moving mechanisms.**

## 1.6 Modifications and Service

The manufacturer will not be held responsible for the safety; reliability or performance of the equipment unless assembly operations, extensions, re-adjustments, modifications and repairs are carried out only by persons authorised by the manufacturer. It should be stressed that those parts of the equipment which are interchangeable, and which are subject to deterioration during operation, may significantly affect the safety of the equipment.

## 2. Introduction

### 2.1 Scope

This manual applies to the KMW150CCD water chiller unit designed and manufactured by Oxford Diffraction.

### 2.2 How to Use This Manual

This manual is aimed at operators of the KMW150CCD who should be trained laboratory technicians and should have been trained to use the KMW150CCD by Oxford Diffraction personnel.

This manual is intended to provide operators with a practical guide to the system and its operation. This is intended to familiarise the operator with how the system works and provide a better understanding of the system operation.

All personnel who are likely to operate the system or come into contact with any of the system components should read the **SAFETY** section of the manual. This provides basic information aimed at highlighting the safety hazards associated with the equipment.

The purpose of this manual is to:

- explain how to operate the equipment
- explain how to interface to the equipment
- list performance characteristics of the equipment
- describe how the equipment operates
- assist with simple fault finding and maintenance

### 2.3 System Description

The KMW150CCD is a stand-alone chiller unit intended for indoor use. It is designed for use with the Sapphire series CCD detector.

The chiller has the following purposes:

To stabilise the temperature of the cooling water that is supplied to the CCD detector

To electronically control the flow of water to the CCD detector.

To control the supply of power to the CCD detector



## 3. Specifications

### 3.1 Environment

Ambient temperature	10°C to 35°C
Storage temperature	10°C to 40°C
Relative humidity	10 – 95% non – condensing
Location	Inside a building

### 3.2 Performance Data

Water flow	1.0 l/min
Water temperature	12-14 °C
Temperature stability	± 2 °C
Water reservoir capacity	25 l

### 3.3 Electrical Services

Power connection	1/N AC 230V, 50/60 Hz
Maximum power consumption	150 W
Maximum mains current	1.0 A
CCD output power consumption	150 W
Main fuse	T2.5 A

### 3.4 Water Supply

Reservoir water	Optically clear, neutral pH, de-ionised water
Connections	Quick-release type, designed for pipes of size 10 x 3 mm

## 4. Technical Description

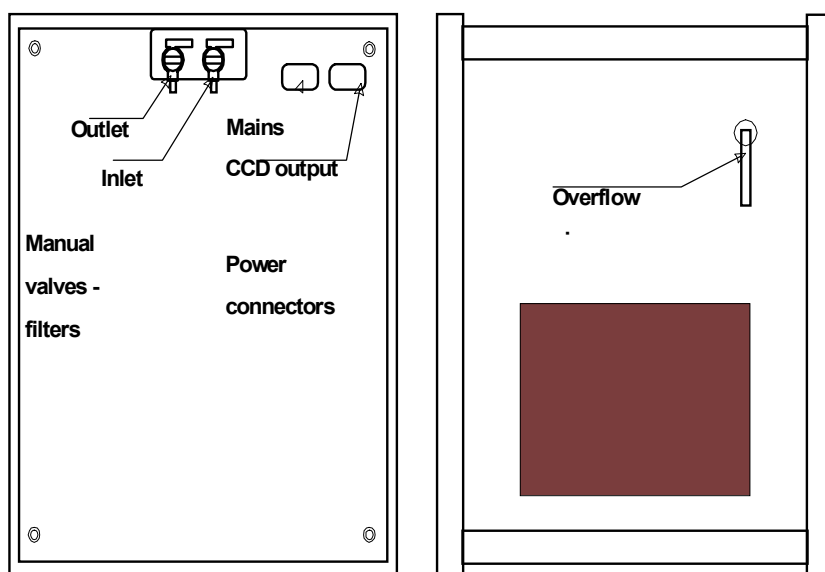
### 4.1 Overview



*Figure 4.1.1 Front View of KMW150CCD Water Chiller*

The KMW150CCD Chiller consists of a metal cabinet containing a water reservoir, a compressor with a radiator, and control circuitry.

Controls and indicators are located on the front panel of the chiller. Water and electrical connections are located on the side of the chiller. An overflow pipe from the water reservoir is located on the back of the chiller.



*Figure 4.1.2 Side and Back Views of the KMW150CCD Water Chiller*

## 4.2 Operating Principles

Inside the KMW150CCD, the compressor is connected to a radiator that is immersed in the water reservoir. A thermostat connected to the compressor ensures that the temperature of the water in the reservoir stays in the range 12-14 °C (or higher depending on the dew point of the operating environment), as required by the CCD detector.

The control circuitry of the KMW150CCD has a logic unit. The logic unit checks signals from:

1. Temperature and water level sensors inside the water reservoir
2. A flow sensor
3. The water pump
4. The compressor.

Refer to Figure 4.2.1 for a schematic diagram of the control circuit.

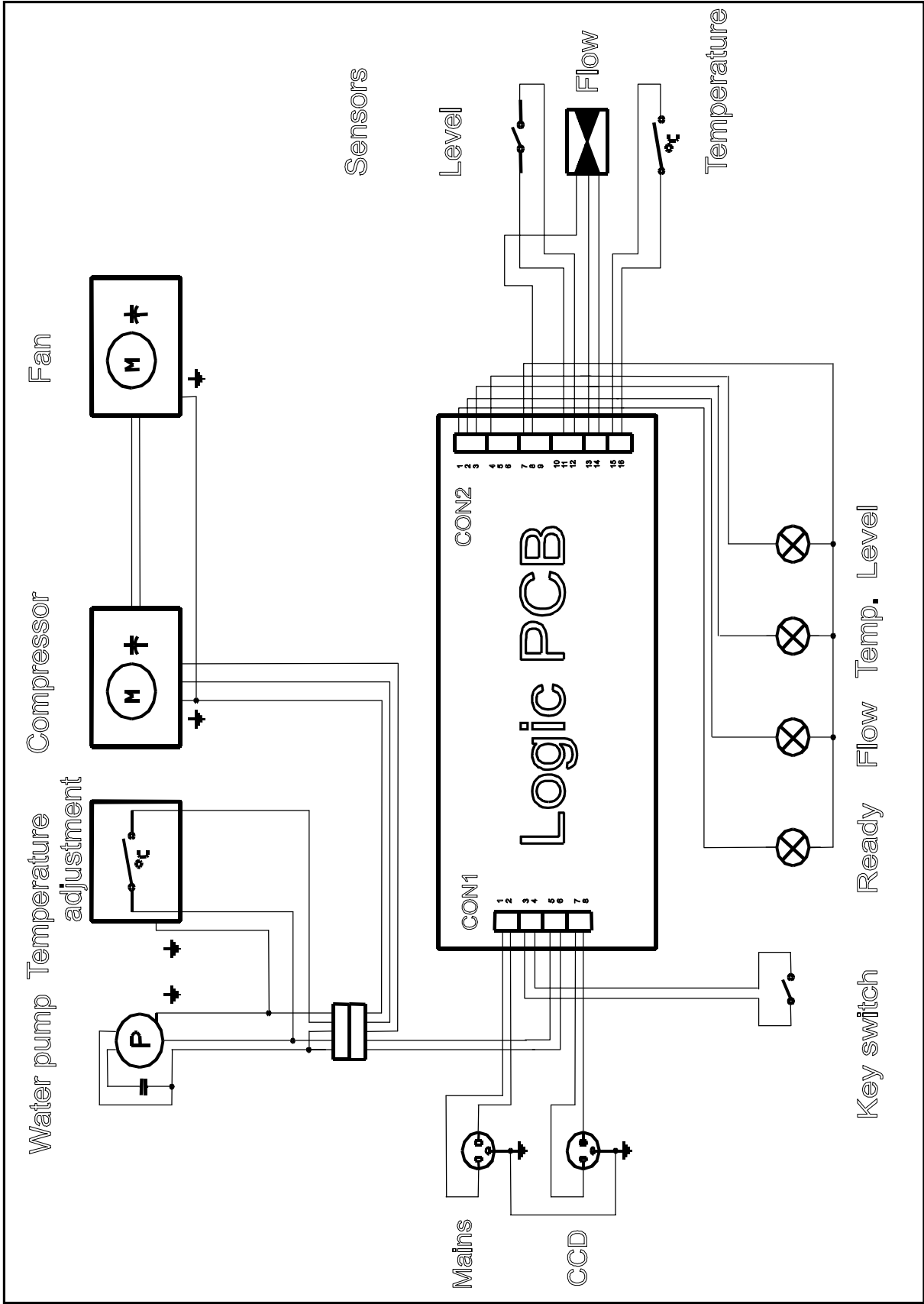


Figure 4.2.1 Schematic Diagram of the Control Circuit

### 4.2.1 Water Conditioning Check

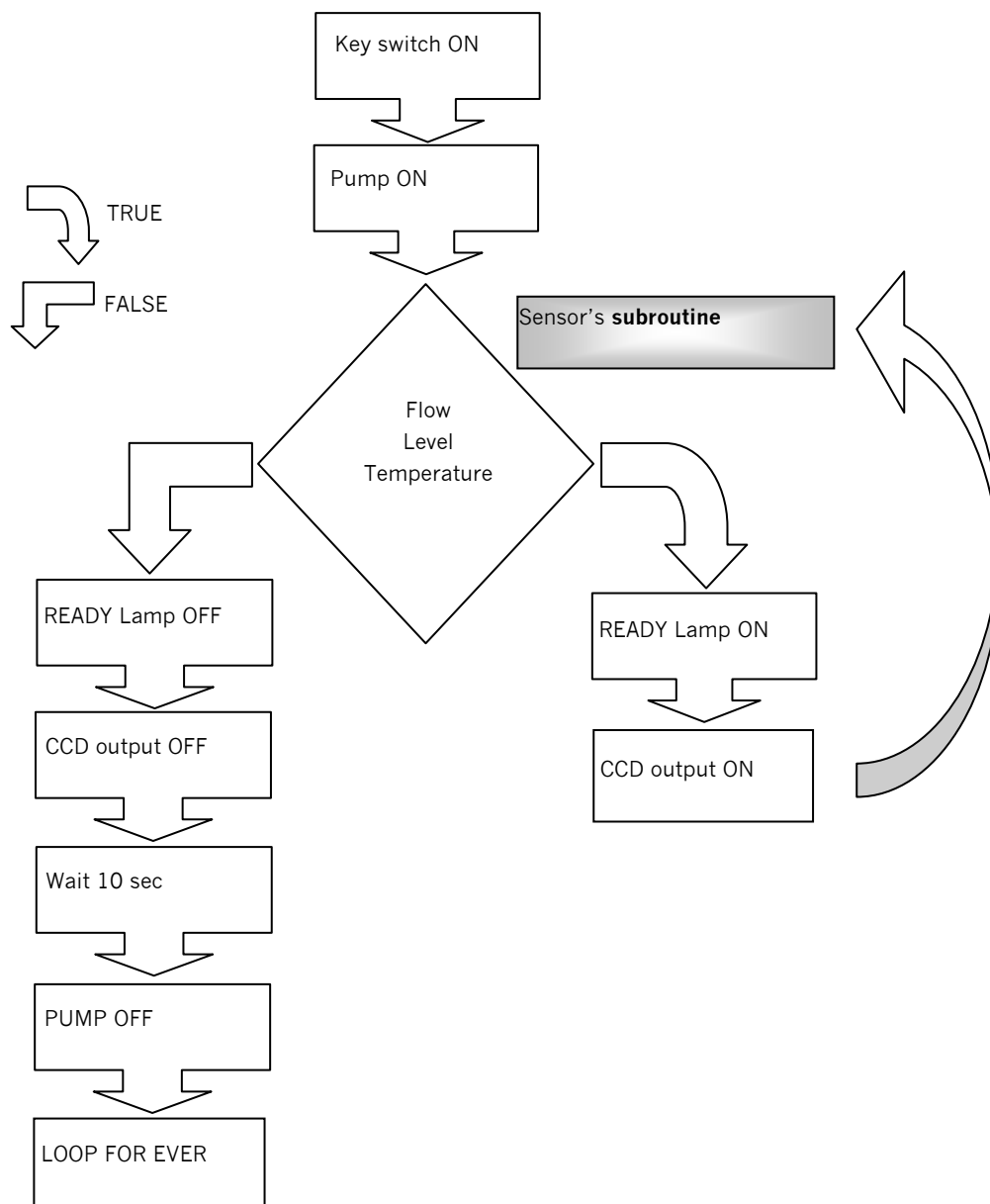
The KMW150CCD performs a water conditioning check when it is initially switched on. This check looks at:

1. The flow rate of the water
2. The level of the water in the reservoir
3. The temperature of the water in the water reservoir.

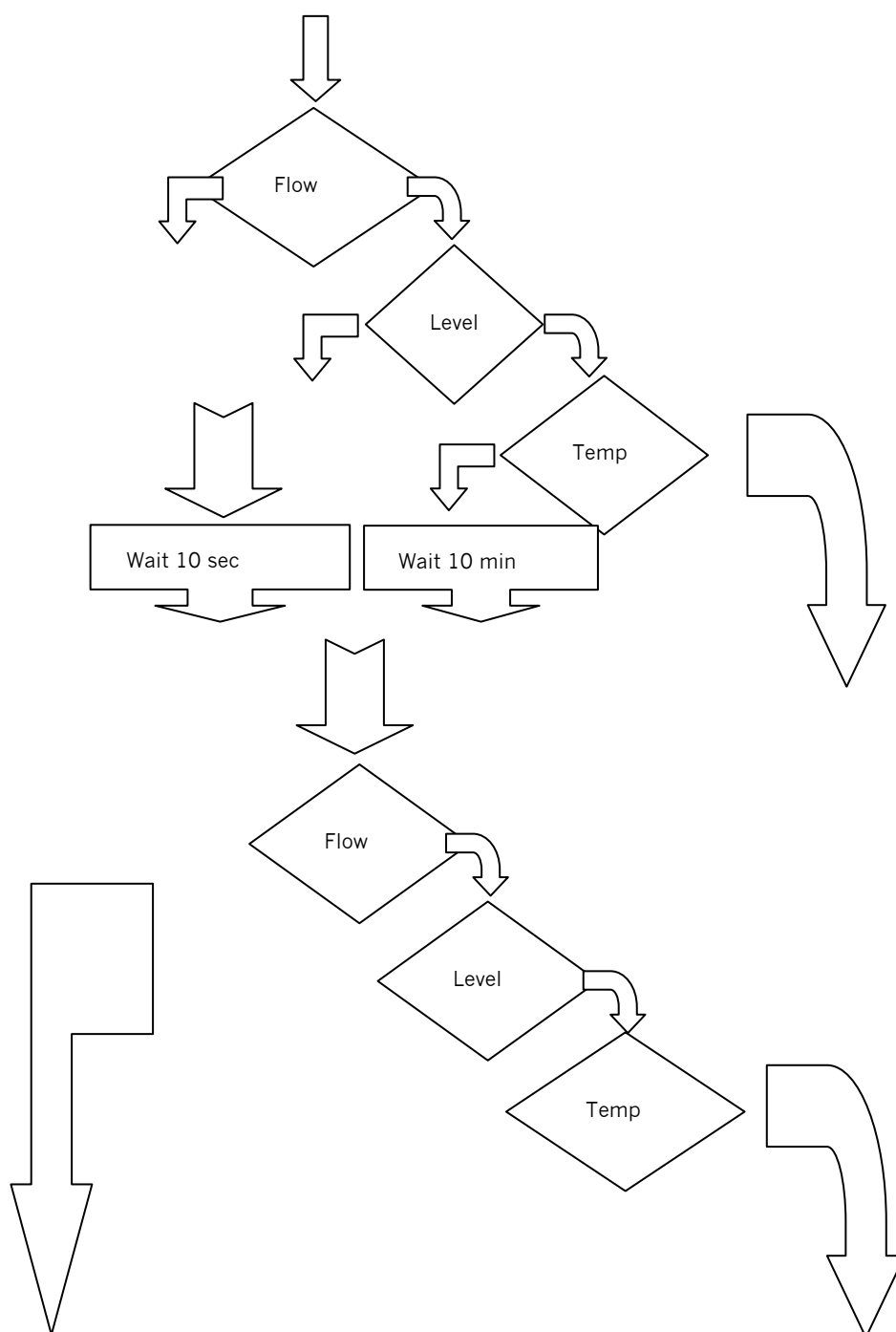
The pump stops after 10 seconds if either the rate of water flow, or the water level in the reservoir, is too low.

The pump stops after 10 minutes if the water temperature in the water reservoir exceeds 18°C.

The state of the unit is displayed on four status lights on the front panel.



**Figure 4.2.2 Water Conditioning Check Routine of the KMW150CCD**



*Figure 4.2.3 Sensor's Subroutine Flow Chart*

## 4.3 Interfaces

### 4.3.1 Water Supply

Two water connections are located on the left side panel of the KMW150CCD. The connectors are combined with manual valves and filters. The connectors are screw type and are designed for pipes of size 10 x 3 mm.

### 4.3.2 Electrical Connections

CON1		
1	MAINS socket A	J1-1
2	MAINS socket B	J1-2
3	Key switch A	J2-1
4	Key switch B	J2-2
5	Pump and compressor powering A	J3-1
6	Pump and compressor powering B	J3-2
7	CCD socket A	J4-1
8	CCD socket B	J4-2
CON2		
16	Temperature sensor A	J5-3
15	Temperature sensor B	J5-2
14	Flow sensor GND	J5-1
13	Flow sensor SIGNAL	J6-3
12	Level sensor A	J6-2
11	Level sensor B	J6-1
10	Not connected	
9	Not connected	
8	Flow sensor +5V	J7-1
7	Lamp common	J8-3
6	Not connected	
5	Not connected	
4	LEVEL status light	J9-2
3	TEMP status light	J9-1
2	FLOW status light	J8-2
1	READY status light	J8-1

## 5. Handling, Installation, Storage and Transit Information

### 5.1 Reception and Handling

#### 5.1.1 Delivery

The following steps should be carried out on delivery of the system and before unpacking the KMW150CCD chiller.

1. When the system arrives, check that there is no visible damage, with the delivery driver present. If damage has occurred contact the carrier and Oxford Diffraction **immediately**.
2. Check that shock-watch and tilt indicators fitted to the outside of the packing case have not been activated. If the indicators have been activated notify Oxford Diffraction **immediately**.
3. Check the number of delivered items against the packing list. If any items are missing contact Oxford Diffraction within 3 days.



#### **WARNING**

**The packing crate is heavy and could cause serious injury and damage to the equipment if not handled correctly. Use suitable lifting equipment and procedures. Only lift the packing case from the bottom.**



#### **CAUTION**

**Do not remove the equipment from the packing crate until it has been moved to its designated installation site. The equipment has been carefully packed to protect the equipment from damage in transit. Removal of the packing equipment could make the equipment vulnerable to damage during transit.**

4. Always lift the packing case from the bottom using suitable lifting equipment (refer to list of component weights in the following section).
5. Move the packing case into the designated installation site.

#### 5.1.2 Unpacking

1. Retain all packing material until installation of the system is completed.

#### 5.1.3 Weights, Dimensions and Lifting Points

Description	Weight kg	Dimensions (width x height x depth) cm	Centre of gravity	Lifting points
KMW150CCD Chiller	20	45 x 53 x 52	Centre of unit	Underneath at the four corners



## 5.2 Installation and Setting to Work

### 5.2.1 Preparation of Site and Services

#### 5.2.1.1 Environmental Requirements

It is the customer's responsibility to ensure that all local building and safety regulations are met.

Ensure that the environmental conditions of the installation site conform to the requirements stated in the SPECIFICATIONS section of this manual.

#### 5.2.1.2 System Layout

The minimum distance between the back, or side of the casing, and other equipment must be greater than 30 cm.

Do not place the KMW150CCD close to any other heat-producing equipment.

#### 5.2.1.3 Electrical Services

The electrical supply must conform to the requirements stated in the SPECIFICATIONS section of this manual.

Locate the electricity supply close to the system and provide:

Phase	L
Neutral	N
Protection	PE

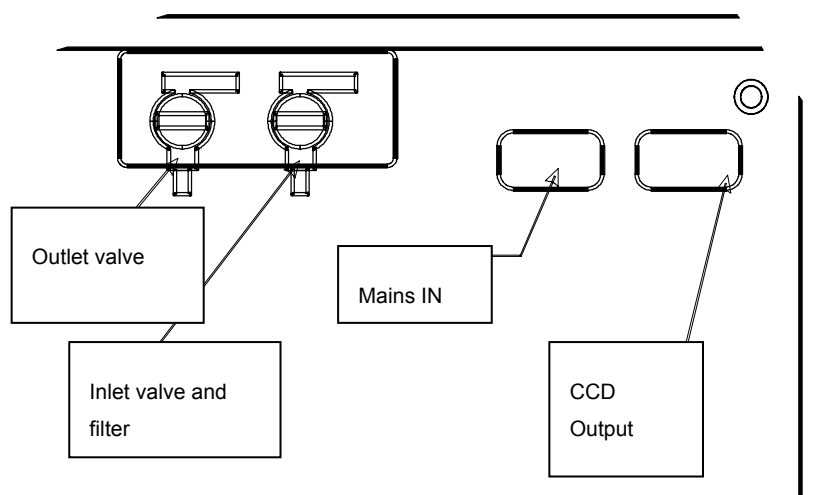
The mains plug should be readily reachable by the operator when the equipment has been installed.

#### 5.2.1.4 Water Supply

Prepare 25 litres of clean distilled water to fill the reservoir.

### 5.2.2 Setting to Work

The location of connectors on the KMW150CCD is shown in figure 5.2.1.



**Figure 5.2.1 Electrical and Water Connections on the Side of the KMW150CCD**

### 5.2.2.1 Equipment Required

25 litres of distilled water

Bucket

Funnel

Power cable for Sapphire series CCD camera

Mains power cable for KMW150CCD

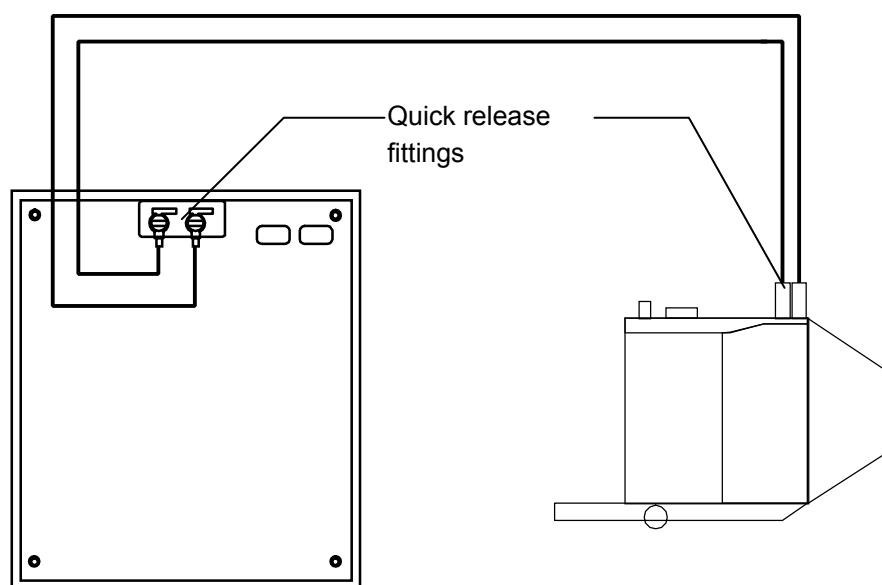
Water pipes (x2, thickness 10 x 3 mm)

### 5.2.2.2 Setting up Procedures

1. Connect the water pipes between the CCD camera and the KMW150CCD. Refer to figure 5.2.2

**NOTE:** Water can flow through the Sapphire series CCD camera in either direction.

**Pipes 10/3 mm**



**Figure 5.2.2 Water pipe connection between KMW150CCD and the Sapphire series CCD detector**

2. Remove the top cover of the KMW150CCD.
3. Place a bucket under the overflow pipe at the rear of the KMW150CCD.

**WARNING**

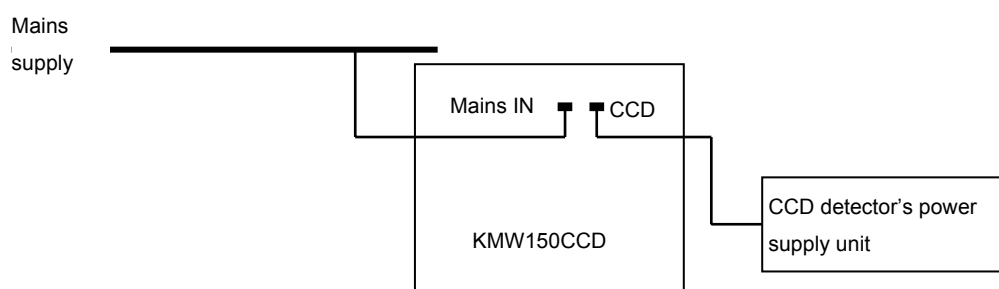
**Do not allow water to splash on the electrical circuits of the KMW150CCD. Failure to do this could cause an electrical shock hazard, and possible damage to the equipment.**

4. Using the funnel, fill the reservoir with water, until water starts to come out of the overflow pipe.
5. Refit the cover on the KMW150CCD.
6. Open the manual valves on the side of the KMW150CCD.

**CAUTION**

**When inserting the Sapphire series CCD detector cable into the KMW150CCD, ensure that the connectors are pushed home firmly.**

7. Connect the power cable for the Sapphire series CCD camera between connector on the CCD camera and the socket marked as CCD on the KMW150CCD. Refer to figure 5.2.3.



*Figure 5.2.3 Electrical power supply to the KMW150CCD*

8. Plug the KMW150CCD power cable into the socket marked **Mains IN** on the KMW150CCD.
9. Plug the other end of the KMW150CCD power cable into the mains electrical supply.
10. The KMW150CCD is now ready to use.

## 5.3 Storage

Before installation commences, or when the system is not being used for extended periods, store the KMW150CCD in accordance with the environmental conditions for temperature and humidity stated in the SPECIFICATIONS section of this manual.

Always store the KMW150CCD chiller in a secure room.

## 6. Operating Instructions

### 6.1 Warnings and Cautions



#### **WARNINGS**

**Dangerous voltages are present on the KMW150CCD's terminals when the power is turned on. To prevent personal injury and possible damage to the equipment:**

- 1. Never connect/disconnect the Sapphire series CCD detector cable from the KMW150CCD when the unit is turned on.**
- 2. Turn off the unit at the mains and remove the plug before filling up the reservoir with water as live parts and rotating parts are exposed when the cover is removed.**
- 3. Ensure that the earth cable is properly connected to the KMW150CCD casing.**

### 6.2 Controls and Indicators

The controls and indicators of the KMW150CCD are located on the front panel.

The KMW150CCD is switched on/off using the mains key switch.

There are four indicator lights marked 'Ready', 'Flow', 'Level' and 'Temp'. The four lights flash when the chiller is performing its automatic water conditioning check. When the chiller is operating correctly the green light illuminates and the three red lights go out.

A temperature gauge indicates the temperature of the water in the reservoir.

### 6.3 Switch-on Procedure

1. Check that the water pipes and electrical cables are properly connected.
2. Switch on the KMW150CCD by turning the key switch to the right.  
The lights on the front panel will flash as the KMW150CCD performs a water conditioning check.
3. After a few seconds, check that the green light on the front panel is illuminated.  
This shows that there is no fault and that the CCD power is on. If the green light does not come on, refer to the TROUBLE SHOOTING chapter.
4. The KMW150CCD is now operational.

## 7. Maintenance Schedule

### 7.1 Introduction

Maintenance must be performed to ensure that the KMW150CCD system continues to operate safely and reliably. This is detailed in the maintenance schedule given below.

**WARNING**

**Failure to perform scheduled maintenance tasks properly and at the correct intervals can affect the safety and performance of this system.**

**WARNING**

**Before performing any maintenance task ensure that you have read and understood the HEALTH AND SAFETY INFORMATION at the beginning of this manual.**

Planned maintenance that can be performed by the user is limited to cleaning the water filters. Other maintenance tasks that the user can perform, e.g. replacing bulbs in the indicator lights and filling the reservoir with distilled water, are carried out as required. Other tasks should be carried out by the user's authorised service representative.

### 7.2 Annual Maintenance Schedule

This schedule may have to be carried out more frequently depending on the water quality and the length of camera operation.

**Tools and Materials:**

Screwdriver or flat wrench (17 mm)

Action	Personnel	Estimated task duration
1. Clean the water inlet filter	Service technician	30 minutes

## 8. Maintenance Instructions

### 8.1 Filling the Reservoir with Water

**Task Time:** 10 minutes

**When:** When the FLOW light on the front panel is illuminated

<b>Tools:</b>
---------------

Bucket

Funnel

25 Litres of clean distilled water (maximum amount required if reservoir is empty)

**Procedure**

1. Switch off the KMW150CCD.
2. Remove the power supply plug from the electricity socket.



**WARNINGS**

Ensure that the power is switched off at the mains and that the plug has been disconnected from the mains power supply before removing the top of the KMW150CCD. Dangerous voltages are present on the KMW150CCD's terminals when the power is on. Rotating parts are exposed when the top of the KMW150CCD is removed when the power is on.

3. Remove the top of the KMW150CCD and locate the filling inlet.
4. Remove the inlet cover.



**WARNING**

Do not allow water to splash on the electrical circuits of the KMW150CCD. Failure to prevent water coming into contact with the electrical circuits could cause an electrical shock hazard, and possible damage to the equipment.

5. Using the funnel carefully fill the reservoir, trying to avoid splashing, until the water overflows through the overflow pipe.
6. Refit the inlet cover.
7. Refit the top panel of the KMW150CCD.

## 8.2 Cleaning the Water Filter

**Task Time:** 30 minutes

**When:** Once a year (dependant on water quality and length of camera operation)

**Tools:**

Screw driver

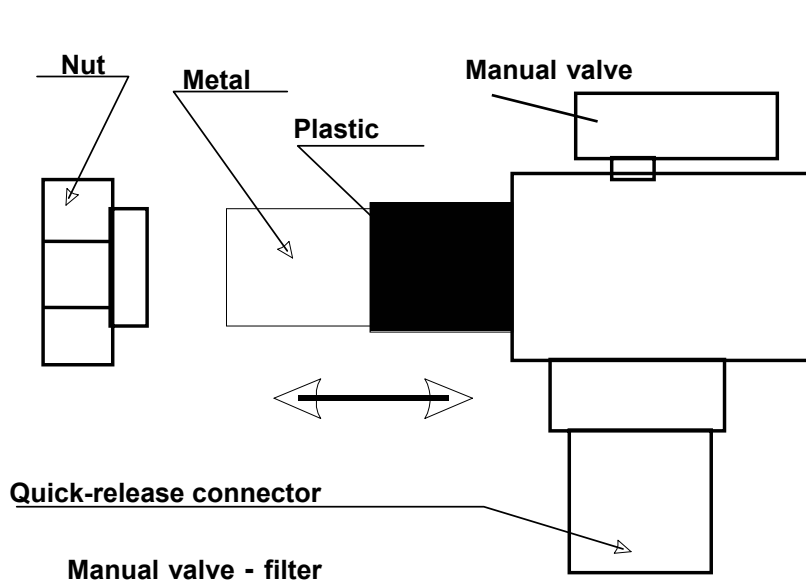
Bucket

Funnel

25 Litres of clean distilled water (maximum amount required if reservoir empty)

**Procedure**

1. Switch off the KMW150CCD.
2. Remove the plug from the electricity socket.
3. Close the manual valves.
4. Using a flat wrench (17 mm) or screwdriver carefully unscrew the retaining nut.
5. Remove the plastic and metal filters.
6. Clean the filters under clean running water.
7. Put the plastic and metal filters back in the correct position.
8. Tighten the retaining nut using a flat wrench (17-mm).
9. Open the manual valves.
10. Check for water leaks. If there are any leaks: remake the connection.



*Figure 8.3.1 Removing the Water Filter*

## 9. Trouble Shooting

Symptom	Fault	Solution
Pump stops after about 10 seconds and the LEVEL light is illuminated	Water level in the reservoir is too low	Fill the reservoir with water (refer to the MAINTENANCE INSTRUCTIONS chapter)
Pump stops after about 10 seconds and the FLOW light is illuminated	Rate of water flow is too low	Clean the water filter (refer to the MAINTENANCE INSTRUCTIONS chapter)
TEMP light illuminated and KMW150CCD stops working after 10 minutes	Temperature of the water in the water reservoir exceeds 18 °C	Cool the water in the water reservoir

### Fuses

Designators	Value	Package	Location
F1	315mA / 250V	5x20mm	Inside KMW150CCD (PCB)
F2	6A / 250V	5x20mm	Inside KMW150CCD (PCB)



## 10. Spares

Part Number	Description
52-AHX1250	Spares kit (fuses and bulbs)

# 11. Additional Information

## 11.1 Drawings

Title
Logic Plate Circuit Diagram
Logic Plate Component Diagram

# 12. CE Conformity Notice

## DECLARATION OF CONFORMITY

This Declaration of Conformity is suitable to the European Standard EN 45014, "General criteria for supplier's declaration of conformity." The basis for the criteria has been found in international documentation, particularly in: ISO/IEC Guide 22, 1982, "Information on manufacturer's declaration of conformity with standards or other technical specifications."

Oxford Diffraction's liability under this declaration is limited to that set forth in the current Oxford Diffraction Terms and Conditions of Sale.

---

**Applied Council Directive(s):**

**89/336/EEC Electromagnetic Compatibility Directive (EMC)  
and amending directives 91/263/EEC, 92/31/EEC, 93/68/EEC.  
73/23/EEC Low Voltage Directive, and amending directive 93/68/EEC**

---

**We, The Manufacturer:**

Oxford Diffraction Ltd  
Abingdon,  
Oxfordshire. OX14 1RL.

declare under our sole responsibility that the following equipment:

**KMW150CCD**

**Serial Number      From: Oxford1/2000 150CCD**

to which this declaration relates are in conformity with the relevant provisions of the following standard(s) or other normative document(s) when installed in conformance with the installation instructions contained in the product documentation:

**EN 55011** Group 1 Class A for radiated emissions.  
**EN 55011** Group 1 Class A for mains conducted emissions.  
**EN 50082-2** Conducted Immunity, ESD and EFT.  
**EN 50081-2** Generic emissions standard.  
**EN 50082-2** Generic emissions standard.

Pertinent LVD sections of:

**EN 61010-1:1993** Amendment A2:1995, Safety requirements for electrical equipment for measurement, control and laboratory use Part 1: General requirements.

**Technical Information is maintained at:**

Oxford Diffraction Ltd  
Abingdon,  
Oxfordshire. OX14 1RL United Kingdom

---

**Last two digits of year of CE Marking (low Voltage Directive): 00**

---

We, the undersigned, hereby declare that the product(s) specified above conforms to the listed directive(s) and standard(s).

Signature:

Full Name:  
Position:  
Date: